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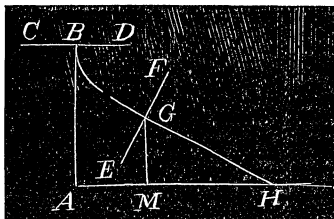
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318. "A man takes hold of the end of a cart tongue and travels off at right angles to the direction in which the tongue originally lay. Required the equation of the curve made by the middle of the axle."

SOLUTION BY PROF. E. B. SEITZ, KIRKSVILLE, MISSOURI.

Let ACD represent the original position of the cart, AB being the tongue, and CD the axle, and let HEF represent any other position of the cart. Draw GM perpendicular to AH . Let $HG = AB = a$, $AM = x$, $GM = y$. Then we have $MH = \sqrt{(a^2 - y^2)}$, and $GM = HM \tan GHM$, or $y = -\sqrt{(a^2 - y^2)} \times dy \div dx$, or $dx = -\sqrt{(a^2 - y^2)} dy \div y$. Integrating, and observing that when $y = a$, $x = 0$, we have

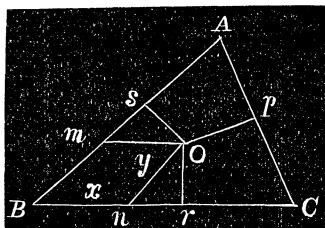


$$x = a \log \left(\frac{a - \sqrt{(a^2 - y^2)}}{y} \right) - \sqrt{(a^2 - y^2)}, \text{ the req'd eq'n.}$$

319. "Within a triangle to determine a point so that if the three perpendiculars are let fall from it upon the sides of the triangle, the latter will be divided into three equal parts."

SOLUTION BY PROF. CASEY.

Let ABC be the \triangle ; take BC , BA as axes of x, y . Let O be the required point; draw On , Om , parallel to the axes, and let $Bn = x$ and $On = y$. The area $BsOr$ is given. $y \times \sin B = Or$ and $y \cos B = nr$; $\therefore x + y \cos B = Br$, $x \sin B = Os$ and $y + x \cos B = Bs$. Whence $(x + y \cos B) y \sin B + (y + x \cos B) \times x \sin B = 2^{\text{ce}} BsOr = \frac{2}{3} \triangle BAC$, or $x^2 + y^2 + 2xy \sec B = \frac{2}{3} \triangle \div \sin B \cos B = \text{a given quantity}$, and \therefore the locus of O is a conic, and for a like reason in regarding the area $ApOs$, the locus of O is also a conic, which determines the point O .



PROBLEMS.

320. By *Octavian L. Mathiot, Baltimore, Md.*—The transverse and conjugate axes of an ellipse being given, to find the diameter of the circular base, and the altitude, of the right cone, and where to pass a plane so as to produce the given ellipse.

321. *By Prof. Johnson.*—From any point B of the circle $x^2 + y^2 = a^2$ BR is drawn perpendicular to the straight line $x = b$. Find the locus of P the symmetrical point of R with respect to the tang't at B and its evolute.

322. *By request.*—The end of a prism is an isosceles triangle, altitude a and base b . The end of this prism is welded to the vertical face of a block of elastic material, the base of the triangular end of the prism being parallel with the horizontal face of the block and projecting a given height h above the block. A given force F_1 is applied at the projecting extremity the direction of which is normal to the vertical face of the block and which is in equilibrium with the forces F_2 and F_3 , of tension and pressure, above and below the neutral axis. Find the position of the neutral axis.

323. *By W. E. Heal, Marion, Indiana.*—Describe the spiral of Archimedes by continuous motion.

324. *By Prof. Kershner.*—Find the envelope of the straight line

$$x \cos \varphi + y \sin \varphi = a (\cos n\varphi)^{\frac{1}{n}}.$$

PUBLICATIONS RECEIVED.

Principles of the Algebra of Logic, with Examples. By ALEXANDER MACFARLANE, M. A., D. Sc. (Edin.), F. R. S. E. 12mo. 155pp. Edinburgh: David Douglas. 1879.

We can, perhaps, best indicate the character and scope of this book, in the space at our command, by the following quotation from the preface: "The work, in its present state, forms an elementary treatise on the science of Formal Logic.

"I consider it proper to state that the theory of the operation of the mind in reasoning about Quality, which is advanced in this work, occurred to me five years ago; and that I have directed towards its development the whole of my subsequent study of the Mathematical, Physical, and Natural Sciences, which are embraced in the curriculum for the degree of Doctor of Science (Mathematics) at the University of Edinburgh."

Measurements of Gravity at Initial Stations in America and Europe. By C. S. PEIRCE. 4to. 145 pp. [Appendix No. 15, U. S. Coast Survey Report of 1876.]

On the Dynamics of a "Curved Ball." By ORMOND STONE, Cincinnati, O. [From the American Journal of Mathematics.]

On the Action of Jets of Water on Curved Vanes. By PROF. I. P. CHURCH, Cornell University. [From Van Nostrand's Engineering Magazine.]

The French Roof Truss. By PROF. P. H. PHILBRICK, Iowa State University. [From Van Nostrand's Engineering Magazine.]

ERRATA.

On page 125, line 1, for "If $a = b$ ", read If $a = b = 1$.

" " 133, line 6 from bot., for $0 = Sa\rho S\beta\rho - Sa\beta$ read $Sa\rho S\beta\rho + Sa\beta$.